THE CENTER FOR REPRODUCTION OF ENDANGERED SPECIES CRES Report

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CRES
THE CENTER FOR REPRODUCTION OF ENDANGERED SPECIES
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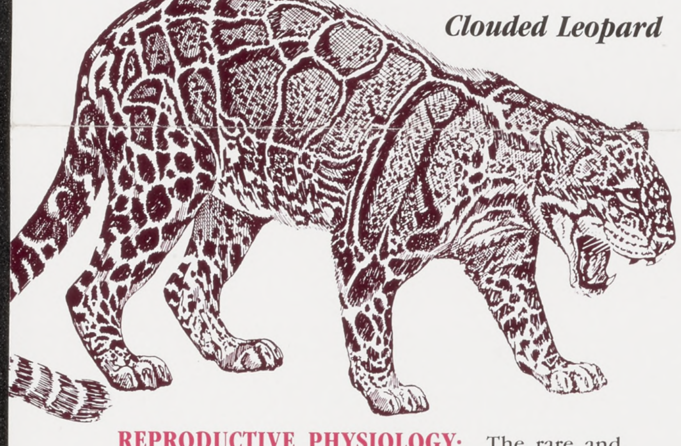
GENETICS: In 1970, more than 60,000 black rhinoceroses sauntered across their African homeland. By 1980, poachers had exterminated all but 15,000. Today fewer than 3,200 black rhinos remain to wage what may be a losing battle for survival.

The International Union for the Conservation of Nature (I.U.C.N.) is developing a strategy to preserve dwindling numbers of black rhinos. The plan calls for captive propagation efforts in Western zoos. Toward this objective the CRES Genetics Division, directed by Dr. Oliver Ryder, is contributing vital information about the genetic structure of the black rhinoceros.

Dr. Ryder's chromosome analyses of 28 black rhinos from Kenya showed their genetic structure to be consistent. But when chromosomes from 2 black rhinos from Zimbabwe were evaluated, the results were truly remarkable: the Zimbabwe black rhinos were found to be genetically distinct from Kenyan black rhinos!

Although the investigation was based on a small number of animals, the message is clear — that proper conservation of gene pools would dictate that these two groups of black rhinos not be interbred. Says Dr. Ryder, "This shows how tenuous our information is about the genetic structure of animal species, and yet that information is so important for proper management of dwindling populations in captivity and in the wild."



Clouded Leopard

REPRODUCTIVE PHYSIOLOGY: The rare and beautiful clouded leopard is notoriously difficult to breed in captivity. The male will often kill the female in his attempt to mate with her, particularly if she is not at the peak of estrus or if she rebuffs his advances.

At CRES, Dr. Barbara Durrant and technician Joan Yamada are implementing artifical insemination to help ensure the continuity of valuable genetic lines among clouded leopards, while protecting the animals from harmful attacks.

With the assistance of the animal's trainers, behavior observations and vaginal cytology are used to monitor the estrous cycles of a hand-raised clouded leopard. Rather than risk injury by pairing her with an aggressive wild-caught male from China, she was inseminated artificially when determined to be in estrus.

Although the first attempt at artificial insemination resulted in pseudopregnancy, the effort will continue. Says Dr. Durrant, "Artificial reproduction is the only feasible way to introduce the genes of this valuable male to the North American population of clouded leopards."

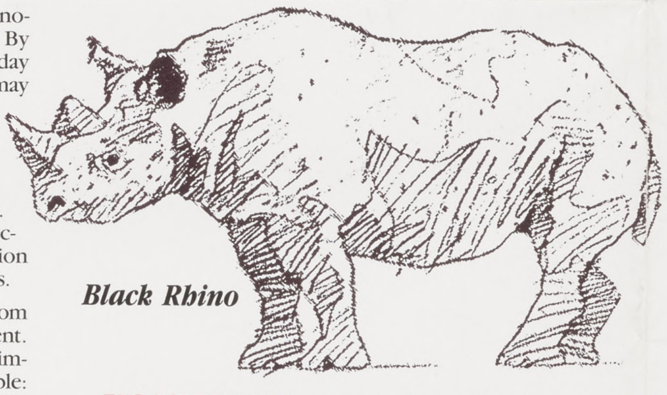
COMPARATIVE PHYSIOLOGY: Dwindling populations of green iguanas are being replenished through the efforts of CRES comparative physiologist Dr. John Phillips. In cooperation with the government and zoo of Belize, Central America, Dr. Phillips has created a program to propagate the green iguana and reintroduce the species into the wild.

A small facility constructed at the Belize Zoo allows thousands of iguana eggs to be incubated in a carefully controlled environment. Hatchlings receive nourishment for six months and are subsequently released into their native jungle habitat.

Because developing countries are unlikely to take over expensive projects, the iguana breeding program is designed to be simple and cost-effective. A study on growth rates of hatchlings showed that readily available diets, such as dog chow, provide an excellent nutritional base, and keep costs down.

Although the project is in its infancy, Dr. Phillips is enthusiastic about its success so far. "In 1987, our start-up year, we had a 97% hatching rate. We expect to return about 1,500 green iguanas to the wild this year, and from 5,000 to 10,000 in 1989.

The artificial breeding techniques pioneered in our studies with green iguanas hold exciting implications for endangered lizards, especially the magnificent monitor lizards. Once funding is obtained, Dr. Phillips plans to establish a breeding center for savannah monitors at the Wild Animal Park using the Belize facility as a prototype.



Black Rhino

ENDOCRINOLOGY: In the wild, gorillas are being hunted out of existence. In captivity, the situation is equally disturbing. Of 188 breeding-age gorillas in North American zoos, 90 have never produced an infant and 54 have produced only one. At CRES, decreased fertility among captive gorillas is the subject of investigation by endocrine specialist Nancy Czekala-Gruber.

In one study, urine samples were collected from a number of fertile and infertile gorillas through several consecutive menstrual cycles. Using a urinary hormone analysis technique developed by CRES scientists, hormone patterns were studied in tandem with behavior observation data.

"We found that gorillas that bred at the time for conception to occur, but did not become pregnant, secreted far lower levels of progesterone in the luteal (latter) phase of their cycle than the fertile group," said Ms. Czekala-Gruber. As in humans, when progesterone levels are insufficient, proper embryo implantation and normal pregnancy cannot occur. The CRES study parallels human research, which shows that similar aberrant hormone profiles can be caused by stress.

In an effort to reduce stress and improve successful reproduction among captive gorillas, many zoos are creating enriched environments that more closely replicate nature.

Toward this end, much can be learned by tapping the knowledge gained by researchers in the wild. Says Ms. Czekala-Gruber, "We need to work with field scientists to determine the physical and psychological needs of these sensitive apes, and apply the data to the establishment of appropriate living conditions."

BEHAVIOR: The lion-tailed macaque breeding program is enjoying remarkable success this year with the births of five infants—three males and two females. According to behaviorist Dr. Donald Lindburg, one or two more of these endangered primates may be born this year.

The five new infants are being observed continuously for the first ten hours postpartum, and three times weekly to the age of six months. This project will reveal new information on maternal care during the period immediately following birth, and will enlighten us on infant development to the age when solid food makes up most of the diet.

"Although lion-tailed macaques were first added to San Diego's collection in 1923, there were no recorded births until 1958," said Dr. Lindburg. "From 1959 to 1980 there were 10 births, and since 1980, when our off-exhibit breeding and research program began, 22 infants have been born."

The San Diego Zoo is home to 38 lion-tailed macaques—more than 10 percent of the world's captive population. Our growing colony has prompted decisions about the future of the collection. According to Dr. Lindburg, most of the lion-tails will eventually move to a breeding corral planned for the Wild Animal Park.

Several macaques will be sent to other zoos, and a social group of 10 will be placed in the new rain forest habitat, scheduled for construction this fall in the Zoo's Bear Canyon.

Gorilla

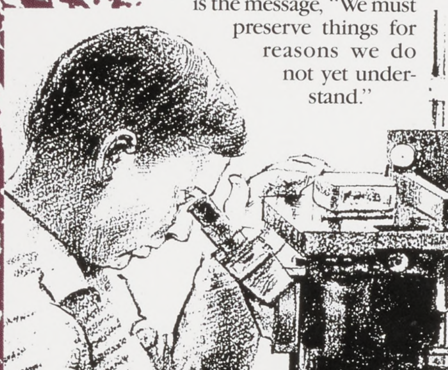
THE FROZEN ZOO: The largest and most diverse collection of wildlife cells in the world is carefully housed in two liquid nitrogen freezers at CRES. Filled to the brim with valuable genetic and reproductive material, the Frozen Zoo contains cells of 1,281 mammals representing 225 species; and some 1,700 semen, ova or embryo specimens from 175 species of mammals, birds and reptiles.

The Frozen Zoo, brainchild of Dr. Kurt Benirschke, represents 16 years of effort to preserve the genetic makeup of vanishing species, about which very little biological data exists. Today, samples from the frozen reservoir are used in chromosome studies, DNA fingerprinting, DNA mapping and sequencing, to investigate inbreeding, heredity and evolution. Reproductive specimens are used to enhance captive breeding of exotic animals through artificial insemination and embryo transfer.

Ms. Arlene Kumamoto, "Curator" of the Frozen Zoo, receives skin biopsy samples not only from our Zoo and Wild Animal Park collections, but from institutions around the world. Samples may be taken during routine examinations, as a result of ear notch identification, or at postmortem. Successful cell cultures have been obtained from samples taken up to five days after an animal has died.

"From a snippet the size of a single pea, cells are dispersed enzymatically and then allowed to attach to the bottom of a flask," explains Ms. Kumamoto. "Bathed in a nutrient mixture, those cells that attach will continue to multiply until enough is obtained to freeze. After carefully removing the monolayer of cells from the flasks, they are put into a medium with a cryoprotectant to prepare them for deep freeze. The cryoprotectant prevents ice crystal damage to the cells upon thawing."

Although this "20th Century Ark" is an invaluable asset to CRES researchers and outside investigators, its potential value may be realized with the advent of future technology. Taped above the Frozen Zoo is the message, "We must preserve things for reasons we do not yet understand."



Frozen Zoo

CRES Report is designed by Stephanie Moore

The Center for Reproduction of Endangered Species (CRES) is operated by the Zoological Society of San Diego, a non-profit organization.

Led by Dr. Werner Hueschele, CRES scientists share their achievements with zoos and wildlife organizations worldwide. One of the ways you can become a part of the international effort to save vanishing wildlife is by joining Critters Club.

For more information, please call Amy Parrott at (619) 231-1515, extension 4249.